C391-E082A

SHIMADZU
Excellence in Science

Wet Oxidation TOC Analyzer

TOC-V Series

TOC-V Series

Wet Oxidation TOC Analyzer

TOTAL ORGANIC CARBON ANALYZER

Shimadzu's Wet Oxidation TOC Analyzers for Ultimate Total Organic Carbon Analysis

Good oxidation performance for organic materials is essential when measuring total organic carbon (TOC).
The Shimadzu wet oxidation TOC analyzer combines oxidants, UV illumination, and heating to achieve powerful oxidative decomposition of organic materials dissolved in water.

- Ultrahigh sensitivity with a 0.5 µg/L detection limit achieves highly accurate measurements, even for ultrapure water.
- The model range includes PC-controlled models for excellent data processing and standalone models for ease of operation.
- An option can be added to measure solid samples
  A single instrument supports both the pharmaceutical water management and cleaning validation demanded in the pharmaceuticals industry.

* The TOC-L series of combustion total organic carbon analyzers is recommended for superior organic substance detection in cases where measurement of organic substances that are insoluble in water, such as suspended organic compounds, is required.

TOC has been adopted in various fields as an accurate quick indicator of total organic content.

- Process control of the organic content in water at all types of factories.
- Environmental and biotechnology research and R&D at test organizations.
- Control of purified or recycled water for the semiconductor, pharmaceutical, water-washing system, or nuclear power industries.

*Compliance with FDA 21 CFR part 11 (CPH, CPN, and WP models).

* PC and monitor are not included.

Contents

Shimadzu Wet Oxidation TOC Analyzers Aim for High Sensitivity with Great Oxidation Performance

Wet oxidation/NDIR method

TOC-VWP

TOC-VWS

TOC-VWP

TOC-VWS

Newly designed high-sensitivity NDIR achieves ultrahigh sensitivity measurements.

Sensitivity and accuracy enhanced by minimizing the reagent blanks that hinder accurate analysis.

Powerful oxidation through a combination of peroxosulfuric acid, UV illumination, and heating.

No need of purging of reagent bottle reduces consumption of carrier gas.

Measurement Principles

TC Measurement

Phosphoric acid and the oxidant (persulfate) are added to the sample, which is heated under UV illumination to convert the TC in the sample to carbon dioxide. This carbon dioxide flows with the carrier gas via the dehumidifier into the NDIR sample cell. The area of the carbon dioxide peak signal is measured and this peak area is converted to TC concentration using a pre-prepared calibration curve.

IC Measurement

The sample is acidified with phosphoric acid and sparged to convert the IC in the sample to carbon dioxide. This carbon dioxide is detected by the NDIR and the sample IC concentration is measured in the same way as TC.

TOC Measurement

Subtracting the IC concentration from the TC concentration determines the TOC concentration.

NPOC Measurement

The sample is acidified with phosphoric acid and sparged to eliminate the IC. The NPOC concentration is determined by measuring the TC (=NPOC) of the sample after the IC is eliminated, using the same method as for TC measurement.

Trace level TOC measurement in ultra-pure water.

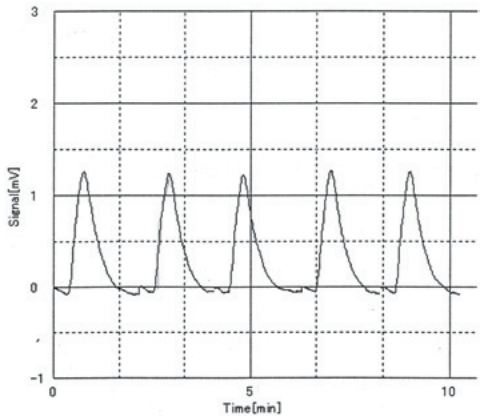
Conditions

Analyzer	TOC-Vws
Principle	TOC measurement by IC removal (acidifying and sparging)
Injection volume	20.4 mL
Number of measurements	5

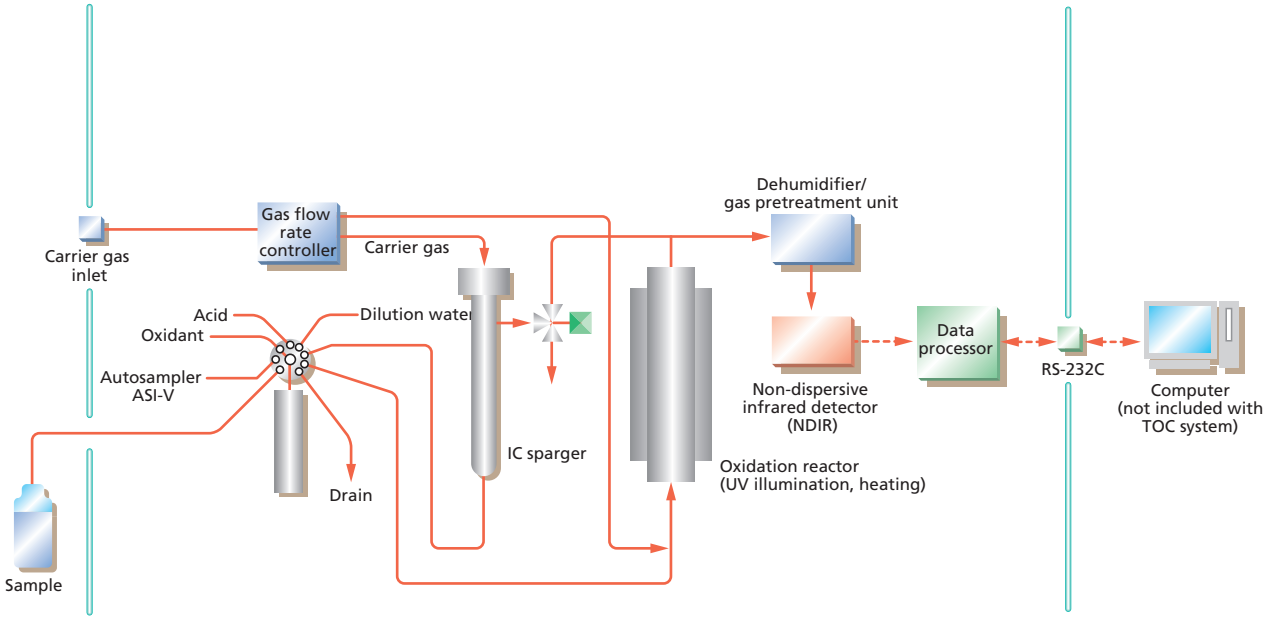
Results

Number	Results (µg/L)
#1	2.31
#2	2.27
#3	2.52
#4	2.47
#5	2.49
mean	2.41
SD	0.114µg/L
CV	4.73%

High-accuracy measurement of TOC as low as 2µg/L (ppb)



Measurement flow line diagram
TOC-Vwp



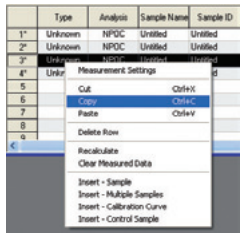
More Powerful, More User Friendly, and More of What You Need!

Operability - Easier and more intuitive.

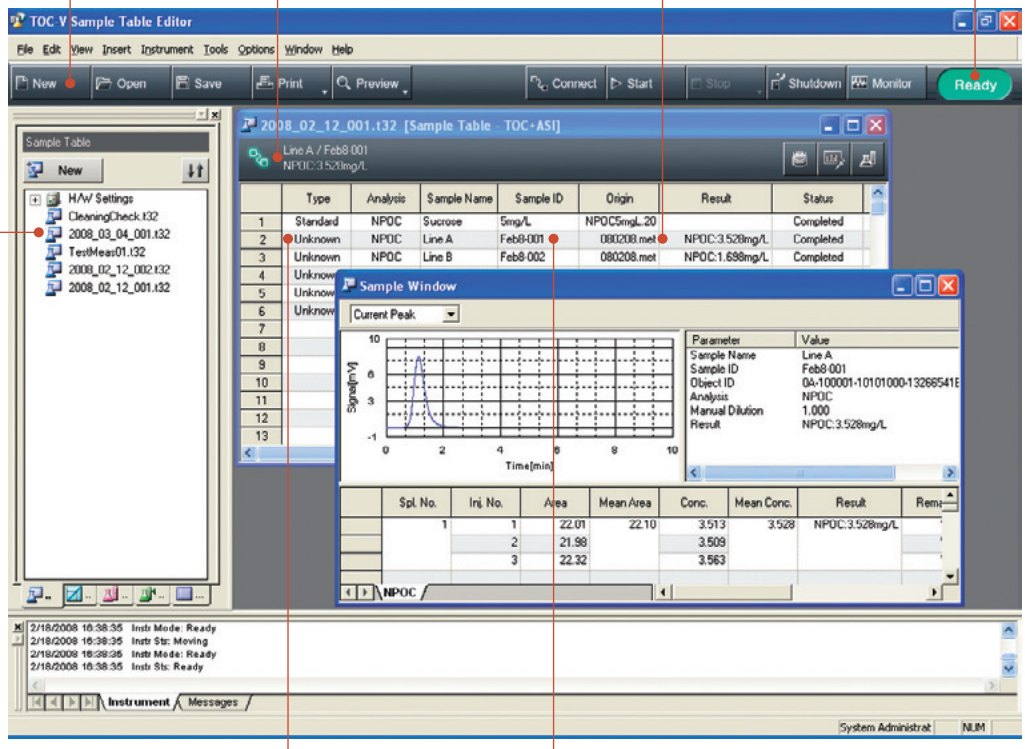
Icons and functions are shown on large buttons.

Easy-to-understand display of sample name, sample ID and measurement results for specified analyte.

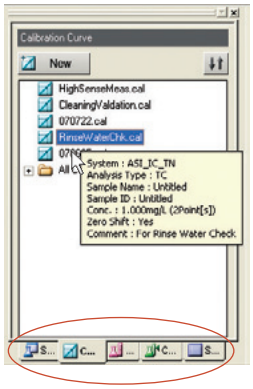
Select operations from the right-click menu on the table.



Uses color and text to clearly indicate the instrument status.

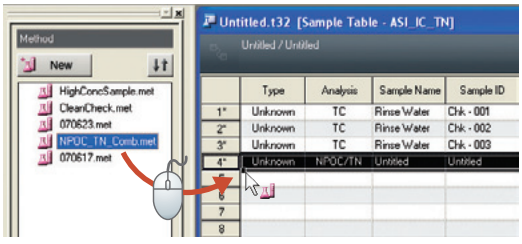


- Lists files being used by type.
- Allows sorting by file name or creation date.
- Shows file contents using tooltip.

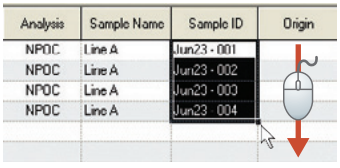


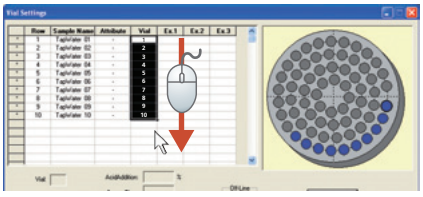
Categorize by type

Samples can be inserted by dragging method files.



The same character strings or serial numbers such as sample IDs and vial numbers can be entered automatically by dragging over the cells.

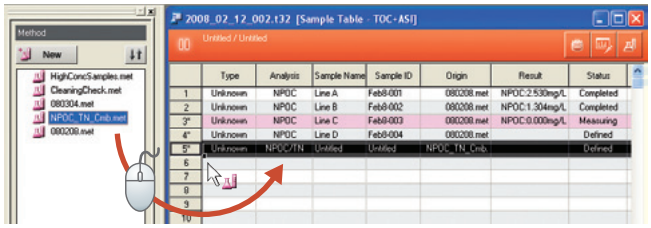




Functionality - Useful functions facilitate your analysis operations.

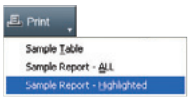
• Add samples to serial measurements already in progress (Stat samples)

Samples can be added even during serial measurements using an autosampler.

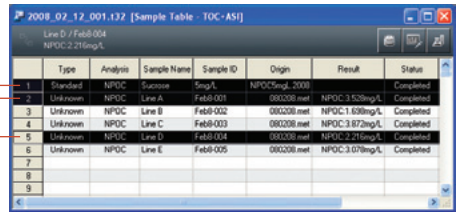


• Select samples to include in report output

Use [Shift] and [Ctrl] keys to select desired samples to be included in report outputs.

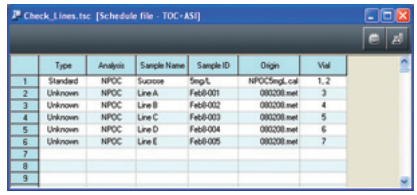


The sample for report output can be appointed voluntarily.



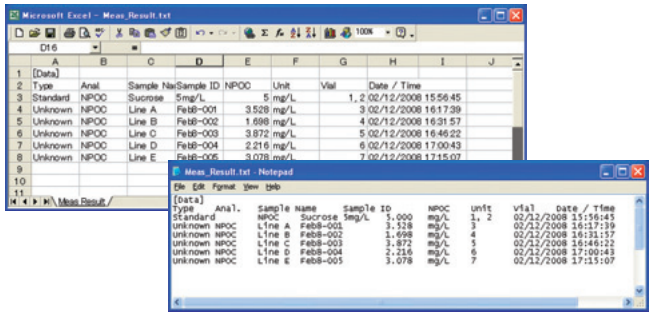
• Create schedule files

Measurement of multiple samples with specified measurement conditions or vial numbers can be registered as a schedule file to facilitate routine measurements.



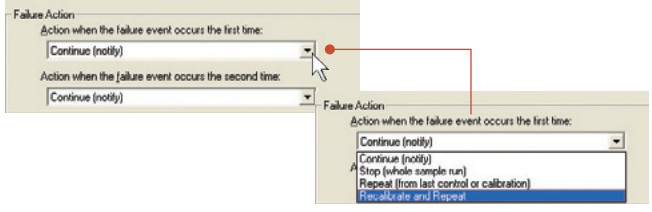
• Import or export text files

Measurement results can be exported as text files that can be used in Excel or other applications. Similarly, text files created according to a specific format can be imported as measurement schedules.



• Quality control

Quality control samples can be inserted in measurement schedules. If measurement results exceed a pre-certified range, recalibration is automatically performed.



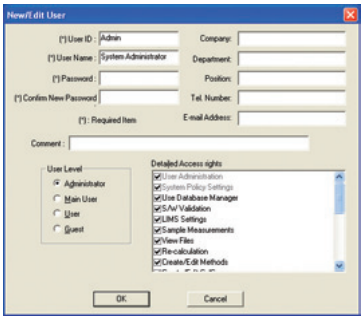
S Model with Screen and Keyboard or P Model Under PC Control
Select the Model that Suits Your Application

Supports FDA 21 CFR Part 11 Compliance

Combining TOC-Control V, which offers security and operation log features, with Shimadzu's CLASS-Agent data management tool, provides full support for complying with FDA 21 CFR Part 11 requirements.

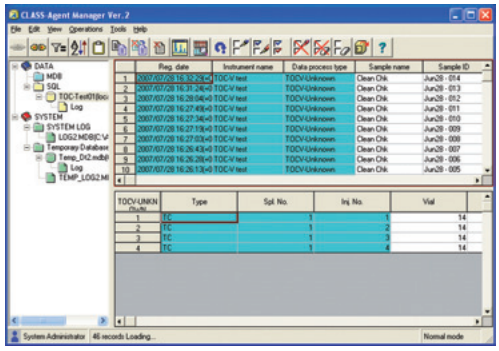
• User Authentication

A user ID and password are used to prevent unauthorized access. Access rights can be specified for individual users.



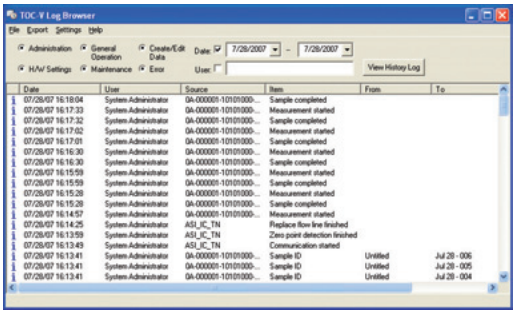
• Link with CLASS-Agent Software

Measurement data from TOC-Control V can be output to CLASS-Agent databases for integral management with data from other instruments.



• Operation Log

The software can maintain a record of all operations, which allows tracking the history of instrument operating status and any changes to settings.



Recommended PC Specifications

Models	DOS / V Compatible Models
OS	Windows 7 Professional (32 bit version) Windows Vista Business (32 bit version) Windows XP Professional (32 bit version)
CPU	2 GHz min. (Windows 7, Windows Vista) 1.5 GHz min. (Windows XP)
Main memory	2 GHz min. (Windows 7, Windows Vista) 1 GHz min. (Windows XP)
Hard Disc	40 GB min.
Monitor	XGA (1024 × 768 cot) min.
Other	CD-R Drive RS-232C Connector

*PC and monitor must be purchased separately.

Features (Common to S and P Models)

Automatic setting of optimal measurement conditions

When creating the calibration curve, the optimal measurement conditions are displayed when the standard solution concentration is set. Detailed calibration curve information can easily be referenced when setting the measurement conditions.

Automatic condition changing and re-analysis of out-of-range samples

If the sample peak goes over the calibration curve range, measurement conditions such as dilution rate and injection volume are automatically changed and the analysis is repeated.

Automatic selection of the best calibration curve

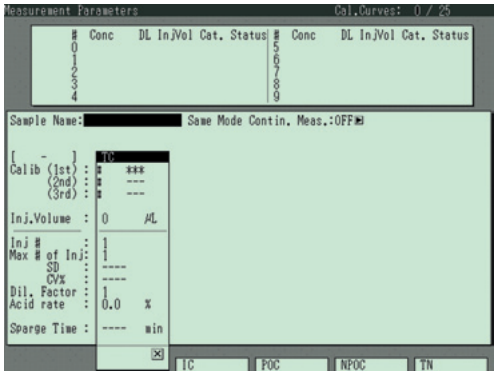
Up to three calibration curves can be set for sample measurement. The optimal calibration curve is selected for the sample and the sample measurements are conducted using these measurement conditions.

S Models

TOC-Vws

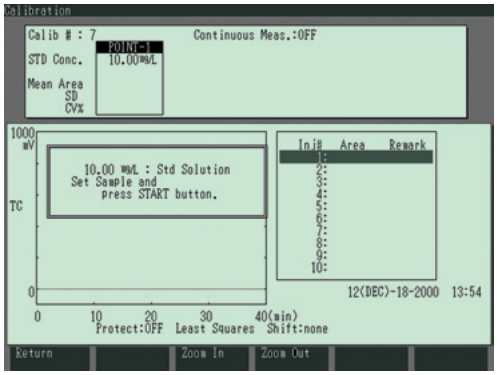
The combination of simple, easily operated keyboard and large LCD makes these models easy to use.

A separate window for each measurement condition setting item enhances clarity and ease of input.



Frequently used functions such as calibration, measurement, and ASI measurement are assigned dedicated keys to reduce operations.

Helpful operation guides are displayed.



The method function registers measurement conditions.

Automatic exclusion of anomalous values and re-calculation of repeated analyses

The mean value, standard deviation, and coefficient of variation are displayed and printed during repeated analyses. Anomalous values can be automatically eliminated and re-calculated.

Convenient automatic power off function

Automatic power off after the electric furnace cools down ensures power is not left on and saves energy.

Comprehensive calibration system handles many uses

- Output is linearized for the entire range.
- Calibration curve can be created to compensate for TC in water used for standard solution adjustment.
- A maximum of 25 (model S; model P has no limit) calibration curves can be stored and recalled. All calibration curve data can be displayed and recorded.

Extensive Options Expand Functionality

Autosampler

ASI-V Even More Functionality and Convenience, Enabling Samples to Be Added During Continuous Measurement

Combining the ASI-V automatic sample injector with a TOC-V Series analyzer creates a fully automatic analysis system.

Features

- Select from two vial types with different capacities to suit your application.
  ・40 mL vials × 68　・125 mL vials × 24
- All vial types have a well sealed septum that can be easily replaced with the screw cap.
- Changing analysis conditions or adding sample vials during analysis is simple. System operation and carrier gas flow can be automatically stopped on completion of measurements.
- Creating multiple calibration curves and selecting the optimal curves for samples with significantly differing concentrations allows these samples to be analyzed in a single run.

8-Port sampler

OCT-1 The Bridge to Ultra-Simplified Automatic Measurement

Features

- Easy-to-use autosampler does not require special vials.
- Up to 8 samples can be measured with a single OCT-1 unit.
  Up to 16 samples can be measured by adding a second OCT-1.
- Commercially available stirrers can be used. (Stirrers are sold separately.)
- Samples can be added during continuous measurement.

* Select either ASI-V or OCT-1. They cannot be used simultaneously.

Solid Sample Combustion Unit

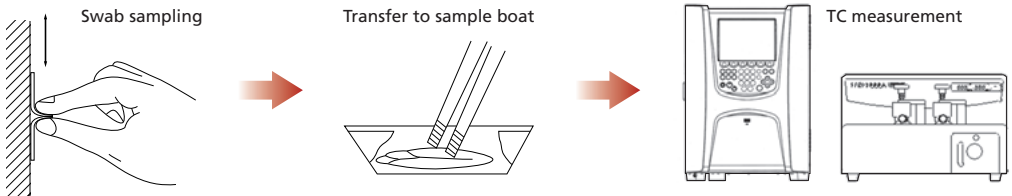
SSM-5000A Capable of TOC Measurements in Solid Samples

In addition to aqueous samples, carbon measurements can also be performed on soil, sludge, sedimentation, and other solid samples. By swabbing, the carbon in attached residues can be measured for cleaning validation.

Features

- Measurement of maximum 1 g samples with up to 30 mg carbon content reduces weighing errors, and errors due to uneven distribution of the sample carbon content.
- A single TOC analyzer unit can handle a range from several 10 ppb TOC in ultrapure water to several 10% TOC in solid samples.
- Measurement of inorganic carbon (carbonate) in solid samples.
- Measurement of aqueous samples containing large quantities of suspended substances.
- Simply change the onscreen settings to switch between aqueous sample measurement with the TOC-V, and solid sample measurement using the SSM-5000A.

【GMP Cleaning Validation Using the Swab Method】



Residue evaluation using swab sampling with quartz microfiber filter paper and direct combustion carbon analysis
(Please contact your local Shimadzu representative for further information.)

Specifications

Total Organic Carbon Analyzer TOC-V Series

	Wet oxidation Total Organic Carbon Analyzer	
Model	TOC-V_{WP}	TOC-V_{WS}
Measurement method	Wet oxidation/NDIR detection	
Operation method	PC-controlled	Standalone
Measured items	TC,IC,TOC,NPOC	
Applicable samples	Aqueous sample	
Measurement range (mg/L)	TC:0 to 3,500 IC:0 to 3,500	
Detection limit	0.5µg/L	
Measurement accuracy (reproducibility)	CV 1.5% max. (CV 2% max.at 100 mg/L or higher)	
Measuring time	TC:Approx. 4 min IC:Approx. 4 min	
Sample injection	Automatic injection	
Sample injection volume	350 to 20,400 µL variable	
IC pre-treatment	Automatic internal acidification and sparging	
Automatic dilution	Dilution factor 2 to 50	
Carrier gas	High purity nitrogen	
Gas pressure	300 kPa	
Gas consumption	Approx. 3,000 L/month (operating conditions: 8 hours/day × 5 days/week)	
Operating keys	Use PC	Built-in
Display	Use PC	Built-in LCD
Printer	PC printer	Built-in
Ambient temperature range	5 to 35°C	
Power supply	AC100~127 V±10%, MAX350 VA AC220~240 V±10%, MAX350 VA	
Dimensions (mm)	W440 × D560 × H460 (excluding protrusions)	
Weight	Approx. 40 kg	

Autosampler ASI-V

Vial types	Select from two types:40 mL,125 mL
Number of Vials	40 mL : 68 125 mL : 24
Vial septum	with dedicated septum
Sample sparging	OK
Dimensions WxDxH(mm)	W370 × D540 × H490 (excluding protrusions)
Weight	Approx. 14 kg

8-Port sampler OCT-1

Number of OCT-1 Connection	Up to 2 OCT-1 units
Vial types	Any sample container can be used
Number of Vials	8 OCT-1 16 for dual OCT-1
Sample spurging	No sparging with OCT-1 (Sparging is done in the syringe of TOC-V)
Dimensions (mm)	W245 × D245 × H440 (excluding protrusions)
Weight	Approx. 3.5 kg

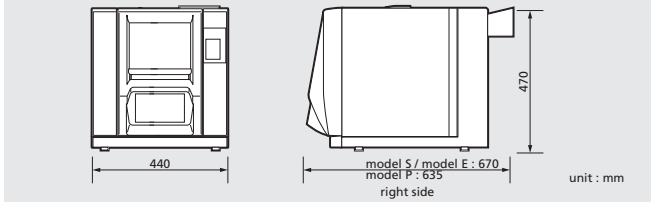
Solid Sample Combustion Unit SSM-5000A

Method	TC:Catalytically aided combustion oxidation at 900°C. IC:Pre-acidification, oven temperature: 200°C.
Measured Item	TC,IC,TOC
Measuring Range*	TC:0.1 to 30 mg carbon (1~20 g carbon in high sensitivity measurement) IC:0.1 to 20 mg carbon
Sample Amount*	1gram-aqueous content < 0.5 g
Analysis Time*	5 to 6 minutes at a gas rate
Carrier Gas	99.9% O_2 at the 500 mL/min. High-purity O_2 Gas is required for high sensitivity measurement.
Power Requirement	100~127 V or 220~240 V as ordered. 700 VA, 50/60 Hz
Dimensions WxDxH(mm)	W450 × D656 × H290
Weight	Approx. 30 kg

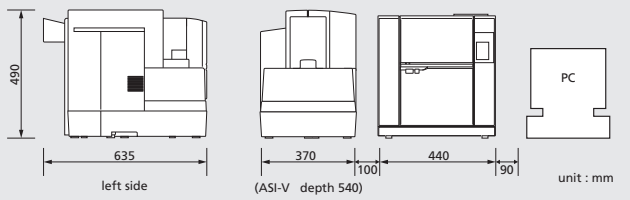
*Will vary with sample type and measurement condition.

External Dimensions Diagram

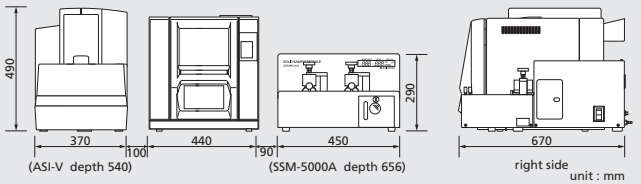
TOC-V Series



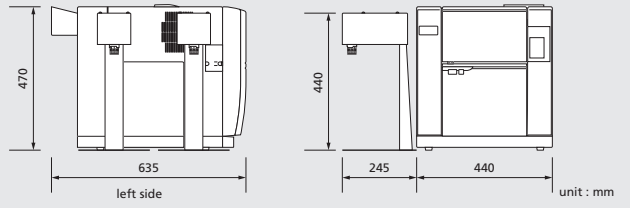
TOC-VWP + ASI-V + PC



TOC-VWS + ASI-V + SSM-5000A



TOC-VWP + OCT-1 (2units)



* Pre-Installation requirements are available. Please request them before installing the system.

Related product

Combustion TOC Analyzer

TOC-L Series

This combustion TOC analyzer covers an ultra wide range from 4 µg/L to 30,000 mg/L. It offers high sensitivity and powerful organic substance oxidation across the range from ultrapure water to highly-polluted water.

On-Line Total Organic Carbon Analyzer

On-Line TOC-VCSH

This is a high-sensitivity on-line total organic carbon analyzer that features low maintenance and the superior oxidation performance of a combustion TOC analyzer. It is the optimal analyzer in situations where highly sensitive TOC measurements are required in pure water or tap water.

Company names, product/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation or its affiliates, whether or not they are used with trademark symbol "TM" or "®".
Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services. Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

For Research Use Only. Not for use in diagnostic procedures.
The contents of this publication are provided to you "as is" without warranty of any kind, and are subject to change without notice. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication.

Shimadzu Corporation
www.shimadzu.com/an/

© Shimadzu Corporation, 2013

Printed in Japan 3655-09309-20AIT